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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,796	11/25/2003	Phui Qui Nguyen	FA1216USNA	8238
23906 7590 11/01/2007 E I DU PONT DE NEMOURS AND COMPANY LEGAL PATENT RECORDS CENTER BARLEY MILL PLAZA 25/1128 4417 LANCASTER PIKE WILMINGTON, DE 19805			EXAMINER TSOY, ELENA	
			ART UNIT 1792	PAPER NUMBER
			NOTIFICATION DATE 11/01/2007	DELIVERY MODE ELECTRONIC

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/722,796
Filing Date: November 25, 2003
Appellant(s): NGUYEN ET AL.

Hilmar Fricke and Jeffrey Safran
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 8, 2006 appealing from the Office action mailed November 21, 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The following are the related appeals, interferences, and judicial proceedings known to the examiner which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal:

Appeal of U.S. Patent Application Serial No. 10/171,206 may directly affect or be directly affected by or have a bearing on the Board of Patent Appeals and Interferences' (hereinafter the "Board") decision in the present Appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,312,943	GAGLANI	5-1994
6,333,077	MAAG ET AL	12-2001

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4,246,368	MURASE	1-1981
6,039,872	WU ET AL	3-2000
5,780,530	MIZUTANI ET AL	7-1998
6,384,125	BERGSTROM ET AL	5-2002
20040110856*	YOUNG ET AL	6-2004
20020174924*	ZANZIG ET AL	11-2002
20020140288*	HERBERGER, SR. ET AL	10-2002
20040044114*	LINSTER ET AL	3-2004
6,156,578*	TOM	12-2000
4,093,600*	FAN ET AL	6-1978
4,458,066*	CARUTHERS ET AL	7-1984
5,378,787*	VRCKOVNIK ET AL	1-1995

* These references were not relied upon in patentability decision, and they do not constitute ground of rejection. They were cited by the Examiner **only in Response to Applicants' Arguments** to show the state of the art.

US 20040110856 to Young et al (See P45) was cited as evidence that, in contrast to Applicants statement, radical polymerization initiated by thermal energy *optionally* requires thermal radical initiators.

The following references were cited to show that, in the absence of definition, broadest reasonable interpretation of *hydroxyl* groups in claim 1 would include silanol groups (which are hydroxyl groups connected to silicon atoms, e.g. on the surface of silica) because in the art the term "silanol group" is used *interchangeably* with hydroxyl group, as evidenced by US 20020174924 to Zanzig et al (See claim 1), by US 20020140288 to Herberger, Sr (See claim 1), by US 20040044114 to Linster et al (See Abstract); or the art refers to silanols as silanol hydroxyl, as evidenced by US 6156578 to Tom (See claim 2), by US 4093600 to Fan et al (See

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claim 3), by US 4458066 to Caruthers et al (See claim 4), by US 5378787 to Vrckovnik et al (See Abstract).

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 3, 5-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Mizutani et al (US 5,780,530) and Wu et al (US 6,039,872).

Mizutani et al disclose a process for multi-layer coating of substrates which comprises the steps of applying a coating layer (See column 14, lines 25-31) directly onto the substrate (See column 14, lines 24-25) or over primer (See column 14, lines 25-31), and baking (curing) the applied coating layer at 140°C to 240°C (See column 14, lines 17-23). Mizutani et al teach that the process can be used for coating automobile bodies (See column 1, lines 6-8). The coating layer is formed from a coating composition comprising a binder system containing polyol resin component (a) having a hydroxyl number from 5 to 300 and a number average molecular weight from 500 to 20,000 (See column 2, lines 12-14). The polyol resin component (a) may be a combination of about 97 % of silicone polyol resin (See column 6, line 33) and 3 % of other polyol (See column 6, lines 32-34) such as acrylic polyol modified to have a plurality of alkoxy group-containing pendant groups (See column 3, lines 51-53) with three alkoxy groups attached to the same silicon atom (See column 3, lines 58-59). The coating composition may contain coloring pigments depending on intended application (i.e. may be clear coating composition) (See column 13, lines 60-61). The silicone polyol resin is an organopolysiloxane having at least two hydroxyl groups in the molecule, the unit of which is represented by the general formula: $(R_a)_n (R_b)_m Si(O)_{(4-n-m)/2}$, wherein R_a is C₁-C₂₀-alkoxy or a monovalent C₂-C₂₀₀ organic group containing carbon-carbon unsaturated function in the chain; R_b is a monovalent organic group having a terminal hydroxyl group and containing carbon-carbon unsaturated function in the chain; m and n are each a positive real number satisfying the relationship of $0 < n < 4$ (i.e. includes claimed 3 alkoxy groups); $0 < m < 4$ and $2 < n + m < 4$ (See column 5, lines 47-64). It is the Examiner's position that the carbon-carbon unsaturated function includes C=C double bond.

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Clearly, equivalent weight of carbon-carbon unsaturated functions including C=C double bond in the organopolysiloxane is within claimed range of 200 to 2000 and a content of silicon bound in alkoxysilane groups is also within claimed range of 1 to 10 wt-%.

Mizutani et al acknowledges that as is well-known in the art, an **alkoxysilyl group reacts with water** to hydrolyze the alkoxysilyl group to a silanol group, the silanol group thus formed condensates with another alkoxysilyl group producing an alcohol as a by-product, two silanol groups condensates producing water as a by-product; and consequently, once the hydrolysis reaction of alkoxysilyl group is initiated, a chain of the above reactions continues until an equilibrium is reached giving the alcoholic by-product and a polycondensate polymer in which a number of **siloxyl linkages** are recurring (See column 7, lines 47-567). Therefore, the coating comprising alkoxysilyl groups would cure upon exposure to air humidity by forming siloxane bridges under the action of moisture, as required by claim 1.

It is the Examiner's position that under the baking conditions of Mizutani et al at high temperature of up to 240°C, the C=C double bonds polymerize via free-radical polymerization because the C=C double bonds are known to be chemically labile and cleave forming free radicals under the application of energy source, as evidenced by Wu et al which show that the application of *any* conventional energy source such as heat, ultraviolet light, gamma radiation, electron beam radiation initiates free radical polymerization of C=C double bonds (See column 12, lines 24-28). Besides, under the baking conditions of Mizutani et al, *chemical* transformation of the C=C double bonds cannot occur any other way than forming free radicals.

Claims 1-6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mizutani et al in view of Wu et al.

Mizutani et al are applied for the same reasons as above. Mizutani et al (i) do not expressly teach that baking promotes free radical polymerization (Claim 1), the heat is applied as convection heat (Claim 9); and (ii) fail to teach that a clear coating is applied over the pigmented coating applied over primed substrate (Claims 2, 4).

As to (i), Wu et al teach that the conditions which promote in situ polymerization and/or crosslinking of the *acrylate* monomers include the application of *any conventional energy source* for initiating free radical polymerization such as heat, ultraviolet light, gamma radiation, electron

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beam radiation, or the like (See column 12, lines 24-28). Thermal curing of acrylate monomers can be carried out at 18⁰C-50⁰C (See column 12, lines 31-36) in the presence of thermal initiators (See column 12, line 4).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have carried out baking a C=C double bond containing coating layer in Mizutani et al at lower temperatures in the presence of thermal initiators with the expectation of providing the desired free radical curing of the coating layer, since Wu et al teach that free radical thermal curing of acrylate monomers can be carried out at 18⁰C-50⁰C in the presence of thermal initiators.

It is the Examiner's position that conventional heat includes convection heat.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used convection heat any conventional heating including in Mizutani et al with the expectation of providing the desired curing of the binder.

As to (ii), It is well known and conventional in the art that to apply coatings repeatedly to achieve the desired thickness of the coating film.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied a clear or pigmented coating composition in Mizutani et al repeatedly with the expectation of providing the desired thickness of the coating film according to well known technique. It would have been also obvious to one of ordinary skill in the art at the time the invention was made to have applied *any* combination of clear or pigmented layers depending on particular need, e.g. a first layer of a pigmented composition over a primer, then a clear sealing layer over the pigmented layer since Mizutani et al teach that a clear or pigmented compositions may be used for forming protective coverings.

Claims 1-6 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gaglani (US 5,312,943) in view of Murase (US 4,246,368), further in view of Wu et al, and further in view of Bergstrom et al (US 6,384,125).

Gaglani discloses a process for protective covering over automobile (See column 1, lines 10-12) which comprises the steps of applying clear or pigmented (See column 7, line 62) coating composition comprising 80 % resin oligomer binder (See column 4, lines 61-67) such as binder

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with urethane linkage (claimed polyurethane) (See column 7, lines 8-42) having both radiation curable olefinic double bonds and condensation curable trialkoxysilane groups (See Formula Ia) and 20 wt % of reactive monomer acrylates (See column 4, lines 61-68; column 8, lines 8-18) including trimethylolpropane tri(meth)acrylate (See column 8, lines 40-41); and curing the coating by UV radiation and by exposure to moisture (See column 9, lines 19-23) thereby providing complete cure of exposed and unexposed (shadow) areas of the coating under conditions of ambient temperature and humidity (See column 4, lines 17-26). The resin oligomer of Formula (Ia) includes oligomer $C_{41}N_4Si_3O_{18}H_{98}$ M.W. 1158) having 2 C=C bonds and 4 silicon atoms. Trimethylolpropane tri(meth)acrylate ($C_2H_5C(CH_2OCO(CH_3)CH=CH_2)_3$ ($C_{18}H_{29}O_6$ M.W. 341) has 3 C=C bonds. Therefore, the coating agent has C=C equivalent weight of the total resin solids content of 374 and Si content of 7.5 wt % (calculation is based on equal parts of both components). Gaglani further teaches that the radiation curable resin formulations may be used as coatings on various substrates including, but not limited to, glass, ceramic, concrete, metal, plastic, brick, paper, cardboard, wood, resilient flooring, e.g., vinyl and vinyl-asbestos tile and vinyl sheet goods, and the like (See column 4, lines 42-48). Coating thicknesses may range from 0.25 to 5 mils (See column 4, lines 48-49). The conformal coatings are especially useful to protect printed circuit boards that have sensitive electronic components from *corrosion* due to fluids, hydraulic fluids, dirt, dust, moisture, mildew, *abrasion*, and damage from handling (See column 4, lines 49-55). the coating compositions may be used with applications to conformal coating circuit board assemblies or other electrical electronic components such as transformers or the like (See column 13, lines 55-61). However, the coating composition is **not limited** to the use in the *electronics* field but may be employed in **any industrial area** where conformal protective coating is desired (See column 13, lines 61-65). Clearly, those industrial areas would include coating vehicles or vehicle parts which require conformal *corrosion* and *abrasion* resistant protective coatings. Furthermore, although Gaglani does not expressly teach the other **industrial** areas, e.g. coating of "vehicle" or "vehicle parts" recited in the preamble, it is held that if the body of a claim *fully and intrinsically* sets forth *all* of the limitations of the claimed invention, and the preamble *merely states*, for example, the *purpose or intended use* of the invention, rather than any distinct definition of any of the claimed

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invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction. See MPEP 2111.02 (II).

Gagliani fails to teach that: (i) the protective covering is formed by at least two coating layers (Claims 1, 2); the protective covering is pigmented and applied over a primer layer (Claim 3); (ii) thermal energy is used instead of UV radiation (Claim 1);

As to (i), Murase is applied for the background information that when metal, wood, plastics or other substrates are coated for decorative or protective purposes with usual coating compositions *including* powder coating compositions, it is more preferable to apply at least two coating compositions of different properties in a plurality of coats than to repeatedly apply a single composition to the desired thickness (See column 1, lines 21-27). A ground coat can be formed from a composition having high adhesion to the particular substrate and other desirable properties such as corrosion resistance (claimed primer), whereas the top coat to be exposed to the atmosphere can be prepared from another composition having, for example, the desired color, gloss, abrasion resistance, photochemical stability, impermeability to chemicals, chemical or physical stability or other properties (See column 1, lines 27-35). When forming composite coatings from liquid coating compositions, at least one composition must be used for each layer to give the properties required thereof, since a single **liquid** composition is unable to afford the plurality of layers having varying properties (See column 1, lines 36-40). Further in the case of *powder* coating compositions, it is usually impossible to form a composite coating from a single composition (See column 1, lines 340-43).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied clear and pigmented coating compositions of Gagliani over primed substrates with the expectation of providing the desired high adhesion to the particular substrate and other desirable properties, as taught by Murase.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied a combination of clear and pigmented coating compositions over substrates in Gagliani since Murase teaches that it is more preferable to apply at least two coating compositions of *different* properties in a plurality of coats than to repeatedly apply a single composition to the desired thickness. It would have been also obvious to one of ordinary skill in the art at the time the invention was made to have applied *any* combination of clear and

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pigmented layers over the primed substrates depending on particular need, e.g. a first layer of a pigmented composition over a primer, then a clear sealing layer over the pigmented layer since Gaglani teaches that a clear or pigmented compositions may be used for forming protective coverings.

As to (ii), Wu et al are applied for the same reasons as above. It is the Examiner's position that conventional heat includes convection heat.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used any conventional heating in Gaglani instead of UV radiation with the expectation of providing the desired curing of the binder, since Wu et al teach that heat is functionally equivalent to ultraviolet light for crosslinking acrylate group containing compounds by initiating free radical polymerization of acrylate groups.

Gaglani in view of Murase in view of Wu et al fail to teach that the binder system further comprises hydroxyl groups.

Bergstrom et al teach that hydroxyl groups (bonded to silicon atoms) are functionally equivalent to alkoxy groups (bonded to silicon atoms) for providing moisture curing of coating film from organosilicon compounds at normal or slightly elevated temperatures with or without the addition of a crosslinking agent and a condensation catalyst (See column 9, lines 49-55).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted some alkoxy groups in the cited prior art with hydroxyl groups with the expectation of providing the desired moisture curing of coating film at normal temperatures since Bergstrom et al teach that hydroxyl groups are functionally equivalent to alkoxy groups for providing moisture curing of coating film from organosilicon compounds at normal or slightly elevated temperatures with or without the addition of a crosslinking agent and a condensation catalyst.

Note that it is well known in the art that upon exposure to moisture alkoxy groups bonded to silicon atoms hydrolyze to hydroxyl groups bonded to silicon atoms (so called "silanol" groups). In other words, some amount of hydroxyl groups would be present in the resin oligomer of Formula (I) or (II) of Gaglani. Therefore, even without teaching of Bergstrom et al, the presence of hydroxyl groups in the resin oligomer would be obvious.

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Claims 1-6 and 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maag et al (US 6,333,077) in view of Gaglani, further in view of Wu et al, and further in view of Bergstrom et al.

Maag et al discloses a process for multi-layer coating of substrates, which comprises the steps of applying a colored and/or effect base lacquer and a clear lacquer topcoat (See Abstract). The clear lacquer topcoat is formed from a coating composition comprising a binder system of resin solids A) and B), wherein the resin solids content contains 50 to 98 wt. % of a system A) thermally curable by condensation reactions and 2 to 50 wt. % of a system B) which is curable under the action of high-energy radiation such as UV radiation (See column 11, lines 8-13) by free-radical polymerisation of olefinic double bonds, wherein the weight percentages adds up to 100 wt. % and the C=C equivalent weight of the total resin solids content of A) and B) is between 300 and 10000 (See column 4, lines 29-44). The component B) is unsaturated polyurethane or silicone (meth)acrylate having number average molecular weights (Mn) preferably in the range from 200 to 10000, and having on average 2 to 20, preferably 3 to 10 free-radically polymerisable, olefinic double bonds per molecule (See column 8, lines 11-18). The process performed using the known wet-on-wet principle allows the production of base lacquer/clear lacquer two-layer lacquer coatings, in particular on motor vehicles (See column 11, lines 52-57) and may be used not only for automotive original lacquer coating and component lacquer coating but also for automotive repair lacquer coating (See column 11, lines 59-60). The clear lacquer coating can be cured by UV radiation (See column 11, lines 8-14) and thermally thereby allowing sufficient curing even for *shaded areas* (See column 11, lines 18-22).

Maag et al fail to teach that the UV-curable polymerizable binder system having a built-in secondary thermally curing mechanism contains a silicone (meth)acrylate component which has urethane linkages and both radiation curable olefinic double bonds and thermally curable condensation groups.

Gaglani teaches that a clear or pigmented (See column 7, line 62) coating composition comprising 20-60% of reactive diluent (solvent for the oligomer) such as vinyl ether monomers, e.g. hydroxybutyl vinyl ether (claimed solvent having water solubility at 20°C of at least 220 g/l) (See column 8, lines 42-55) and 40-80 % of a silicone (meth)acrylate resin oligomer binder (See column 4, lines 61-67) with urethane linkage (claimed polyurethane) (See column 7, lines 8-42)

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having both radiation curable olefinic double bonds and condensation curable trialkoxysilane groups (See Formula Ia) can be used in UV-curable polymerizable binder system having a built-in secondary moisture curing mechanism (See column 9, lines 20-23) to provide complete cure of exposed and unexposed (shadow) areas of the coating under conditions of humidity (moisture curing) (See Abstract) for the use in protective coverings over automobile (See column 1, lines 11-13). In addition to free-radical polymerisation of olefinic double bonds, with e.g. C=C equivalent weight of the total resin solids content of 579 (See column 10, lines 49-63, Formula (Ia) ($C_{41}N_4Si_3O_{18}H_{98}$) having M.W. of 1158, Si content of 7.2 wt %).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a coating composition of Gaglani as a clear lacquer coating composition in Maag et al with the expectation of providing the desired cure of exposed areas under UV radiation and complete cure of shadow areas under conditions of ambient temperature and humidity, as taught by Gaglani.

Maag et al in view of Gaglani fail to teach that thermal energy is used instead of UV radiation (Claim 1).

Wu et al are applied for the same reasons as above. It is the Examiner's position that conventional heat includes convection heat.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used any conventional heating in Maag et al in view of Gaglani instead of UV radiation with the expectation of providing the desired curing of the binder, since Wu et al teach that heat is functionally equivalent to ultraviolet light or gamma radiation (high energy radiation) for crosslinking acrylate group containing compounds by initiating free radical polymerization of acrylate groups.

Maag et al in view of Gaglani in view of Wu et al fail to teach that the binder system further comprises hydroxyl groups.

Bergstrom et al are applied here for the same reasons as above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted some alkoxy groups in the cited prior art with hydroxyl groups with the expectation of providing the desired moisture curing of coating film at normal temperatures since Bergstrom et al teach that hydroxyl groups are functionally equivalent to

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alkoxy groups for providing moisture curing of coating film from organosilicon compounds at normal or slightly elevated temperatures with or without the addition of a crosslinking agent and a condensation catalyst.

(10) Response to Argument

Applicants' arguments filed on June 8, 2006 have been fully considered but they are not persuasive.

1. Claims 1, 3, and 5-6 are Novel Over Mizutani et al

2. Claims 1-6 and 9 are Nonobvious Over Mizutani et al in View of Wu et al

(A) Applicants argue that the curing mechanism of Applicants' claimed invention is based on radical polymerization of C=C double bonds and moisture curing. The coating composition disclosed in Mizutani et al comprises a film-forming polyol resin (e.g., a silicone polyol), a curing agent for the polyol (melamine resin or blocked polyisocyanates), and a hydrolyzate/polycondensate of trialkoxysilane or tetraalkoxysilane. The silicone polyol contains hydroxyl groups and, optionally, alkoxysilane groups. According to the formula at column 5, line 55, of Mizutani et al., C=C double bonds may also be present. Curing is effectuated by reaction of the hydroxyl groups of the polyol resin with the functional groups in the curing agent (e.g., NCO groups). Mizutani et al. is not directed to moisture curing, even if alkoxysilane groups are present (see column 4, lines 3-16). When alkoxysilane groups are present in the coatings of Mizutani et al, the alkoxysilyl equivalent weight is greater than 650, with a most preferred alkoxysilyl equivalent weight of about 1500 (see column 4, lines 3-6). However, when the alkoxysilyl equivalent weight is too small, namely **too many** (emphasis added by the Examiner) alkoxysilyl groups are present in the copolymer, the acid or alkali resistance of the coating film will be adversely affected due to the formation of -Si-O-Si- and -Si-O-C- linkage upon curing and the coating composition tends to gel when exposed to moist air or become susceptible to cracks when cured films are formed therefrom. Thus, moisture curing should be avoided in the coating compositions of Mizutani et al. The curing mechanism in the compositions of Mizutani et al. is the reaction between the hydroxyl groups of the different polyols and the curing agent reactive with hydroxyl groups. Wu et al. adds nothing to the Mizutani et al. disclosure that relates to differences between Mizutani et al. and the presently claimed invention. Wu et al.

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merely discloses that radical polymerization can be initiated by heat or UV radiation, a concept well known in the art. Applicants thus rely upon the arguments presented in Section VII(C)(1) *supra* in rebuttal to the Examiner's assertion that claims 1-6 and 9 are obvious over Mizutani et al in view of Wu et al

The Examiner disagrees. First of all, alkoxy groups attached to the silicon atom would form siloxane bridges upon exposure to moisture whether it is acknowledged or not because of the *inherent chemistry* of alkoxysilyl groups which **cannot** be interfered with occurring of reaction between the hydroxyl groups of the polyol resin with the functional groups in the curing agent (e.g., NCO groups). This is not contradicted by Mizutani et al because, in contrast to Applicants' statement, Mizutani et al warn that if **too many** (e.g. **more than 1500 of equivalent weight**) alkoxysilyl groups are present in the copolymer, the acid or alkali resistance will be adversely affected (See column 4, lines 8-15) because (**too**) many siloxane bridges would be formed. In fact, Mizutani et al specifically teach to *modify* acrylic resin to introduce a plurality of alkoxy group-containing pendant groups (See column 3, lines 51-53) with three alkoxy groups attached to the same silicon atom (See column 3, lines 58-59) but not more than 1500 of equivalent weight (See column 4, lines 5-6).

Moreover, the coating composition of Mizutani et al containing the same functional groups as in claimed invention such as C=C double bonds and alkoxysilyl groups in the same equivalent weight range would undergo the same curing mechanism as in claimed invention (e.g. free radical polymerization of the C=C double bonds and formation of siloxane bridges) because it is cured at the same conditions as in claimed invention, namely, thermally and exposure to air moisture.

(B) Applicants argue that even if radical polymerization of double bonds may occur by initiation with thermal energy as asserted by the Examiner, there is no indication in Mizutani et al that the optionally present C=C double bonds are polymerized via radical polymerization to cure the coating composition. Nothing in Mizutani et al. indicates that the coating compositions therein are cured by radical polymerization, and the mere fact that radical polymerization may occur by heat does not rise to the level evidence tending to show inherency. Indeed, the intrinsic evidence in Mizutani et al itself confirms Applicants' position. For example, radical polymerization initiated by thermal energy requires thermal radical initiators. Mizutani et al,

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however, fail to disclose any thermal initiators. Thus, Applicants respectfully submit that curing via radical polymerization is not disclosed either expressly or inherently in Mizutani et al. Contrary to the Examiner's assertion that it is irrelevant whether Mizutani et al. disclose coating compositions curable by radical polymerization, it is absolutely relevant whether Mizutani et al. disclose that their coating compositions are cured by radical polymerization. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference", MPEP 2131 (quoting Verdegaal Brothers 7. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987)), and "to establish prima facie obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art." MPEP 2143.03 (citing In re Royka, 490 F.2d 981 (C.C.P.A. 1974)).

The Examiner respectfully disagrees with this argument. The Applicants' statement that "radical polymerization initiated by thermal energy requires thermal radical initiators" is not correct. It is well known in the art that thermal initiators may be optionally combined with unsaturated compounds to initiate free-radical polymerization of the unsaturated compounds in thermal curing, as evidenced by US 20040110856 to Young et al (See P45). Therefore, heating of unsaturated compounds in Mizutani et al up to 240°C would certainly trigger radical polymerization of the unsaturated compounds even in the absence of thermal initiators.

Claimed curing mechanism is **inherent** in Mizutani et al because the coating composition of Mizutani et al containing the same functional groups as in claimed invention such as C=C double bonds and alkoxysilyl groups in the same equivalent weight range would **inherently** undergo the same curing mechanism as in claimed invention (e.g. free radical polymerization of the C=C double bonds and formation of siloxane bridges) because it is cured at the same conditions as in claimed invention, namely, thermally and exposure to air moisture.

3. Claims 1-6 and 8-9 are Nonobvious Over Gaglini in View of Murase in Further View of Wu et al. in Further View of Bergstrom et al.

(A) Applicants submit that the Examiner has failed to establish a prima facie case of obviousness. Murase is directed solely to powder coatings (See column 1, lines 5-10). Gaglini, on the other hand, is directed solely to solvent-free, low viscosity liquid compositions (see column 2, lines 63-67). Gaglini is not directed to a process for the coating of vehicles. The

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coating of vehicle/automotive bodies requires different technology and different quality demands compared with coatings used for protecting printed circuit boards. As such, one of ordinary skill in the field of automotive coatings would not look to Gaglani to produce Applicants' claimed invention. The mere fact that a circuit board may be in an automobile, a fact Applicants do not dispute, does not automatically mean that a circuit board is a "vehicle part" within the scope of Applicants' specification.

The argument is unconvincing. Firstly, the automobile printed circuit board of Gaglani can be *broadly* interpreted as a vehicle part as claimed. Secondly, although the title of Murase relates to powder coating compositions, Murase was applied not for his invention but for a *background* information of well known facts in the coating field, namely, when any substrate, e.g. metal, wood, plastics, is coated for decorative or protective purposes with usual coating compositions including powder coating compositions, (i.e. the usual procedure in the coatings field in general), is to apply at least two coating compositions of different properties in a plurality of coats than to repeatedly apply a single composition to the desired thickness (See column 1, lines 21-35). Moreover, Murase expressly discusses this background statement for **both liquid and powder** coating compositions: "When forming composite coatings from liquid coating compositions, at least one composition must be used for each layer to give the properties required thereof, since a single **liquid** composition is unable to afford the plurality of layers having varying properties (See column 1, lines 36-40). Further in the case of *powder* coating compositions, it is usually impossible to form a composite coating from a single composition" (See column 1, lines 340-43). In other words, the background part of Murase relied on by the Examiner is related to coating compositions in either liquid or powder form. Therefore, Murase is relevant to any coating compositions including dual cure conformal coating formulations of Gaglani for application to any substrate in any industrial field.

Gaglani is directed to dual cure conformal coating formulations (See column 1, lines 5-6), which may be used with applications to conformal coating circuit board assemblies or other electrical electronic components such as transformers or the like (See column 13, lines 55-61). However, Gaglani does **not limit** the use of his dual cure conformal coating formulations to the *electronics* field by teaching that they may be employed in any industrial area where conformal protective coating is desired (See column 13, lines 61-65). Clearly, those industrial areas would

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include coating vehicles or vehicle parts which require conformal protective coatings.

Furthermore, although Gaglani does not expressly teach the other **industrial** areas, e.g. coating of "vehicle" or "vehicle parts" recited in the preamble, it is held that if the body of a claim *fully and intrinsically* sets forth *all* of the limitations of the claimed invention, and the preamble *merely states*, for example, the *purpose or intended use* of the invention, rather than any distinct definition of any of the claimed invention's limitations, then the preamble is not considered a limitation and is of no significance to claim construction. See MPEP 2111.02 (II).

Therefore, the Examiner has established a prima facie case of obviousness.

(B) Applicants state that even if the above references can be combined, the Examiner's characterization of Bergstrom et al. is inaccurate and does not supply the disclosure missing from Gaglani, Murase. Specifically, Bergstrom et al do not teach that hydroxyl groups are functionally equivalent to alkoxy groups for providing moisture curing. Bergstrom et al. disclose the basic principle of the vulcanization mechanism for silicone sealants (see column 2, lines 24-33). Curing is effectuated by hydrolysis/condensation of silanol (-SiOH) or alkoxy silane (-Si(OR)₃) groups. In other words, the OH groups mentioned in Bergstrom et al are part of the SiOH groups, whereas in the present invention, in addition to the alkoxy silane groups (-Si(OR)₃), single OH groups are present, linked to the backbone of the binder, and are not hydrolysable. Unlike the hydroxyl groups in the present invention, the hydroxyl groups in Bergstrom et al participate in curing. The Examiner's assertion that "one of ordinary skill in the art knows that OH groups are hydroxyl groups no matter to what atoms they are linked" is inaccurate. The mere fact that a compound contains an OH group does not mean that the OH group is reactive as a hydroxyl group.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., **non-reactive hydroxyl groups** and **single OH groups linked to the backbone of the binder that do not participate in curing**) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Moreover, following the Applicants' logic, upon exposure to moisture of a resin oligomer of Formula (I) or (II) of Gaglani some amount of hydroxyl groups would be present in the resin

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oligomer since alkoxy groups bonded to silicon atoms would hydrolyze to hydroxyl groups bonded to silicon atoms (so called "silanol" groups). Therefore, the presence of hydroxyl groups in the resin oligomer would be obvious even without applying teaching of Bergstrom et al.

Furthermore, claims recite no negative limitation that OH groups should be non-reactive and should not be linked to silicon atom. Therefore, hydroxyl groups as claimed read on hydroxyl groups of any type, i.e. it is irrelevant to which atom they are linked.

(C) Applicants argue that the Examiner's assertion that "one of ordinary skill in the art knows that OH groups are hydroxyl groups no matter to what atoms they are linked" is inaccurate. The mere fact that a compound contains an OH group does not mean that the OH group is reactive as a hydroxyl group. For example, a carboxylic acid contains an OH bonded to a carbon. It is text book organic chemistry, however, that this OH group is not viewed in isolation, but rather the entire COOH group is viewed as a carboxyl group. The reactivity of this carboxyl group in comparison to an alcohol containing a hydroxyl group is, of course, vastly different.

The argument is unconvincing because broadest reasonable interpretation of *hydroxyl* groups in claim 1 would include silanol groups (which are hydroxyl groups connected to silicon atoms, e.g. on the surface of silica) because in the art the term "silanol group" is used *interchangeably* with hydroxyl group, as evidenced by US 20020174924 to Zanzig et al (See claim 1), by US 20020140288 to Herberger, Sr (See claim 1), by US 20040044114 to Linster et al (See Abstract); or the art refers to silanols as silanol hydroxyl, as evidenced by US 6156578 to Tom (See claim 2), by US 4093600 to Fan et al (See claim 3), by US 4458066 to Caruthers et al (See claim 4), by US 5378787 to Vrckovnik et al (See Abstract) all of them showing that "... amorphous silica which contains **hydroxyl groups (e.g. silanol groups)** on its surface, and (3) a coupling agent having a moiety reactive with **hydroxyl groups on the surface of said silica ...**". Or the art refers to silanols as **silanol hydroxyl**, as evidenced by US 6156578 to Tom (See claim 2), by US 4093600 to Fan et al (See claim 3), by US 4458066 to Caruthers et al (See claim 4), by US 5378787 to Vrckovnik et al (See Abstract).

4. Claims 1-6 and 8-9 are Nonobvious Over Maag et al. in view of Gaglani in Further View of Wu et al. in Further View of Bergstrom et al.

Applicants argue that the claimed invention is nonobvious over Maag in view of Gaglani. The second curing mechanism of Maag et al. is different from that claimed in the present invention. In Applicants' claim 1 invention, the second curing mechanism is the moisture curing (hydrolysis) of alkoxysilane groups (see page 4, lines 19-23 of Applicants' specification), whereas in Maag et al. the second curing mechanism is a polycondensation or addition reaction between complementary reactive functional groups (see column 4, line 63 – column 5, line 53). Thus, the disclosure of Maag et al teaches away from the Applicants' claimed second curing mechanism.

The Examiner disagrees with this argument. First of all, in contrast to Applicants statement, the second curing mechanism described at column 4, line 63 – column 5, line 53 of Maag et al is NOT restricted to a polycondensation or addition reaction between complementary reactive functional groups. Instead, Maag et al teach that in the systems curable by **condensation** reactions (See column 4, lines 63-66) **NO restrictions** apply to the binder (See column 5, lines 7-8). Therefore, a UV-curable polyurethane (meth)acrylate binder of Calgani having alkoxysilane groups which are cured by **condensation** upon exposure to moisture would be a suitable binder of Maag et al. Note that the hydrolysis and **condensation** of alkoxysilane groups upon exposure to moisture may be accelerated thermally, as evidenced by US 4528390 to Kimura by teaching: “Preferably the hydrolysis-condensation reaction is conducted under heating, since the reaction time can thereby be *reduced* to obtain the desired product more readily. The heating temperature can be varied depending on the amount of the alkoxysilane or its partially hydrolyzed condensate described above or the amount of aqueous solution of ammonia or amine. Generally the temperature may be the reflux temperature of the reaction mixture. The reaction time is 1 to 2 hours at 70°C -90°C” (See column 2, lines 47-61).

(11) Related Proceeding(s) Appendix

None

For the above reasons, it is believed that the rejections should be sustained.

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Respectfully submitted,

Elena Tsoy
Primary Examiner
Art Unit 1762
October 25, 2007

ELENA TSOY
PRIMARY EXAMINER



Conferees:

Timothy Meeks



Glenn Caldarola

